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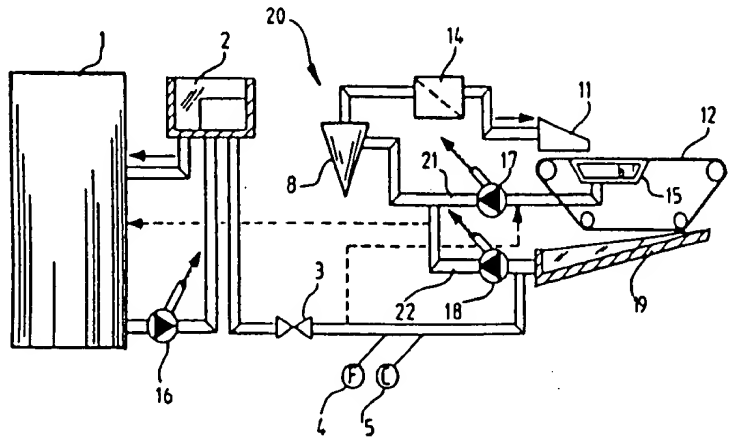


(57) Abstract

An approach flow apparatus for causing pulp slurry to flow between a pulp slurry storage tank (1) and the forming wire (12) of a forming section of a paper making machine includes a pipe system (20) for conveying the slurry from the storage tank (1) toward the forming section for permitting the flow of the slurry; and a deaerating centrifugal pump (16) interposed in the pipe system (20) for causing the slurry to flow and for removing gas from the slurry, and for venting the removed gas to a location outside of the pipe system (20).

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# METHOD AND APPARATUS FOR STABILIZING AND SIMPLIFYING AN APPROACH FLOW SYSTEM FOR A PAPER-MAKING MACHINE

The present invention relates to the treatment of pulp before depositing the pulp onto a wire in a paper-making machine. More precisely, the present invention concerns a method and apparatus for stabilizing an approach flow system for a paper-making machine.

Paper is produced on a paper-making machine by distributing an aqueous suspension of pulp in the form of a thin layer onto a forming wire and then removing the water as the first stage of paper production. Before the pulp suspension is deposited onto the wire, air or gas and impurities are removed from the pulp. In order to produce uniform paper, the amount of the pulp in the spray of the aqueous suspension is accurately and continuously adjusted.

Gas is present in pulp suspensions mainly in three forms, namely, in the form of small bubbles, dissolved or chemical bound gas.

The chemically bound gas or dissolved gas seldom causes problems in the pulp and papermaking processes but can cause problems if conditions are changed and bubbles start to form.

Gas bubbles in the fiber suspension can be present as free bubbles in the liquid between the fibers or as bound bubbles attached to fibers. Both bound and free bubbles cause problems in the papermaking processes. Free bubbles cause special problems in the pulp and papermaking processes when they are present in too great an amount. The problems include foam problems, instability of the processes, decreased deaerating, and the like.

watering!





The method of the present invention relate to the separation and removal of most of the free air bubbles so that the problems caused by an excess amount of free air bubbles is eliminated.

Total gas removal is generally accomplished by another type of gas removal, so-called mechanical gas separation. With this method, all of the free and bound gas bubbles are removed. Also part of the dissolved gas is removed. This type of gas removal is performed immediately in front of the paper machine forming section to avoid pinholes and other problems on the forming wire. This method, which is described by K.D. Kurz, Tappi Engineering Conference, Sept. 19-21, (1978), is expensive and creates large amounts of foam when the fiber suspension is ejected with high speed onto a metal surface in a vacuum tank.

As pointed out, the traditional degassing assemblies in the pulp and paper industry are remarkably space demanding and hence costly, and the separated gas occurs in large volumes, from which reclaiming and conveying thereof is difficult. The most usual degassing equipment is a tank having a large diameter in which the gas in a gas contained liquid is permitted to rise to the liquid surface of the tank for removal. In order to be certain that a sufficient time period for degassing is given, the diameter of such a tank in large pulp plants can be 10-20 m and the height 5-6 m. It will thus be apparent to persons of ordinary skill that investment costs for a degassing tank of this kind are high and the reclaiming of gas therefrom is difficult.

As mentioned, in pulp and paper production, any existing gas or air results in serious disadvantages which impact on both the process, the product and the pumping of pulp or fiber suspensions. The most important of these disadvantages are:

- problems resulting from air induced foam;

- increased capillarity and pin holes in the final product resulting from excess air;
- instability in conduit lines, valves and screens, etc.
- increased pump cavitation;
- dewatering problems;
- fiber flocculation;
- decreased formability by a wire.

An object of this invention is to eliminate or reduce the severity of the above listed problems.

In the drawings, wherein like reference characters denote similar elements throughout the several views:

FIG. 1 is a diagrammatic view of an approach flow and white water circulation apparatus in accordance with the prior art;

FIG. 2 is a diagrammatic view of an approach flow and white water circulation apparatus in accordance with the present invention; and

FIG. 3 is a schematic illustration of a preferred control circuit for a degassing apparatus for use in the present invention.

As used throughout this specification (including claims), the word "gas" is intended to include any and all gases, whether free, combined or dissolved, including by way of example only air; and the expression "deaerating pump" or "degassing pump" is intended to mean a centrifugal pump capable of separating gas (as above defined) from the working liquid passing through the pump, which includes a gas channel for conveying separated gas from a zone upstream of or in front of the impeller to a zone downstream of or in back of the impeller, said pump further including a vent to permit the removal of said separated gas from the pump. Examples of suitable deaerating pumps are a pump



sold as a degassing MC™ pump by the assignee of the present invention, A. Ahlstrom Corporation, another pump sold by said assignee under the trademark AHLSTAR™ equipped with AIRSEP™ degassing. Also as used herein, the term "liquid" is intended not only to embrace liquids as conventionally defined but also slurries and suspensions which flow like liquids or are caused to flow through a deaerating pump like a liquid.

FIG. 1 illustrates a usual prior art approach flow and white water circulation system, also called short circulation system, for a paper-making machine. Referring to FIG. 1 in detail, a tank 1 contains a pulp slurry for producing paper. A pump 6 connected to the outlet of tank 1 charges pulp from tank 1 into the white water circulation via level chest 2 a surge drum 2, a grammage or regulator valve 3, a fluid volume gauge 4 and a consistency level gauge 5. The purpose of the level chest 2 is to ensure a constant input pressure for the regulator valve 3 so that the pulp flow is as constant as possible. This is important to avoid thickness variations in paper due to varying amounts of pulp fiber in the pulp slurry or suspension. The illustrated prior art system for charging the pulp slurry is good in principle but it is inaccurate when and if the pulp slurry in the tank 1 contains varying amounts of air. Then the weight of the column of slurry before the regulator valve 3 will vary and will cause variations in the pulp amount flowing to the paper-making machine. One purpose of the present invention is to eliminate this problem caused by air.

The expression white water circulation system for the paper-making machine means a system wherein the water removed from the pulp slurry in the forming section of the paper machine is recycled and utilized to dilute the approaching pulp slurry, the consistency of which is between 3-5%, to a consistency between 0.5 - 1.0%, which is a normal consistency when the pulp slurry is deposited

by a headbox 11 onto the wire 12. In FIG. 1 the approaching pulp flows via the grammage valve 3 into a fan pump 7, wherefrom it is pumped together with water from a save-all tray 13 through a centrifugal cleaner 8, a deaeration apparatus 9, a headbox charge pump 10 and a screen 14 into the headbox 11, wherefrom the pulp slurry is distributed in the form of a thin layer jet onto the wire 12. From the wire, water, often due to gravity or suction or both, runs through the wire 12 into the save- all tray 13 for return as above described.

When air is mixed in with either the pulp slurry or the water or both, it will cause various problems for the white water circulation system described above. If the air reaches the headbox 11, air bubbles cause empty places in the jet as it is distributed onto the wire which results in holes in the paper web being formed. In order to avoid this, the white water circulation system may be provided with a special deaeration apparatus 9, which is usually a large vacuum tank, wherein air entrained in the white water is separated by means of the under-pressure in the apparatus 9. The water flowing from the wire 12 into the save-all tray 13 picks up sizeable amounts of air and thus causes irregularities in the operation of the pump 7. To reduce the air content of the water, tray 13 is designed to be large, whereby the air is permitted to rise to the surface of the water in the save-all 13 where it passes into the atmosphere. However, a part of the air remains entrained in the save-all tray water which often causes malfunctions of the white water circulation system.

Another object of the present invention is to eliminate these problems of the white water circulation caused by the air as well as to make the big save-all tray unnecessary.

A further object of the present invention is to eliminate problems caused by air and gasses to simplify the process



and apparatus for circulating white water as well as to decrease construction costs for a plant.

These objects have been achieved by the method and arrangement mentioned in the beginning, the characterizing features of which are presented below. The invention is based on the novel and fundamental insight that gas and air problems can be avoided by removing air and/or gas by means of deaerating and/or degassing pumps, whereby are achieved gas-free or essentially gas-free pumping and pulp flows. According to a preferred embodiment of the invention, the deaerating pump is a centrifugal pump capable of separating gas from pulp slurry and gather said gas centrally in front of the pump impeller and a passage extending from in front of said impeller through the impeller back plate to a location behind the impeller from which the gas is exhausted by means of a vent preferably connected t. an under-pressure source, e.g. an exhaust pump. One example of such a pump is the AHLSTAR™ pump with its AIRSEP™ features commercially available from the assignee herein, or the pump illustrated in FIG. 4 of a PCT application filed contemporaneously herewith by J. Elonen & al, based on FI 904003 for METHOD AND APPARATUS FOR FLOTATION SEPARATION, although other pumps may be used instead. In some usages, the input pressure at the suction side of the pump is high enough to expel the separated gas without the need for any exhaust pump and the gas will flow out from the vent of the deaerating centrifugal pump as a result of the input pressure. Another suitable pump which is commercially available from the assignee of the present application, A. Ahlstrom Corporation, is a so-called degassing MC™pump, which can be used for accomplishing the objects of the invention because the pump has been designed in the first place to eliminate pump cavitation when gas or air containing substances are pumped.

The invention and advantages achieved with said degassing pump are set forth more precisely below with reference to the accompanying FIG. 2.

Referring now to FIG. 2 which is a diagram of the presently preferred embodiment and is thus exemplary of various structures, systems and methods embodying the present invention, the approach flow apparatus incorporates means for supplying pulp slurry or paper stock to the headbox 11 of a paper machine which also includes a forming section comprising a forming wire 12. The pulp slurry supply means here shown is a tank 1 which is connected to the headbox 11 by a pipe system 20.

According to FIG. 2, a first deaerating pump 16 is connected into a pulp slurry line of pipe system 20 on the outlet side of means for supplying pulp slurry, here shown as pulp tank 1. The pump 16 transfers the pulp slurry into a level chest 2, from which it flows through a grammage valve 3 into a white water circulation system comprising a part of pipe system 20. As a result of the deaeration by pump 16, the specific gravity of the column of the pulp slurry immediately in advance of the grammage valve 3 remains constant and a constant flow is thus achieved for the white water circulation. Also the valve 3 operates more regularly as a result of the constant low amount of air remaining entrained in the pulp slurry.

In the white water circulation the water passing through the wire is gathered to be recirculated with one or two pipe branches which will be described more precisely as follows.

A suction box 15 is placed under the wire 12 of the forming section to collect water. The water so collected contains air. The air containing water is fed from suction box 15 through a branch pipe 21 to a second deaerating pump 17 of the deaerating- pump design. The preferable consistency



of the pulp slurry as it leaves the headbox is about 1%; that is to say, that there exists 99 tons of water per each ton of pulp fiber. The web formed on the wire 12, after dewatering by suction box 15 will have a consistency of about 5%; that is to say that there exists 19 tons of water per each ton of pulp. Thus, through the branch pipe 21 and pump 17 will pass about 80 tons of water for each 100 tons of slurry introduced onto forming wire 12 by headbox 11. By the time the web traverses the entire forming section on wire 12, the consistency of the web is about 10%; that is to say that into a water collection tray 19 will be gathered about 10 tons of water per each ton of pulp fiber. This water will be pumped together with other waters, like waters from wire washing sprays, through a branch pipe 22 by a third deaerating pump 18. In this manner, significant advantages are achieved, namely:

- the elimination of traditional big save-all tray 13 (see FIG. 1), for the purpose of gathering the water removal from the web on the forming wire 12;
- the need to separate the air from water collected in a conventional large save-all (such as save-all 13 in FIG. 1 by escape to the surrounding atmosphere through the large surface of such a large save-all;
- the water in branch pipes 21 and 22 at the discharge sides of deaerating pumps 17 and 18 is essentially air-free; and
- suction effect of the deaerating pump 17 can, when so needed, be also employed for imparting a suction effect in suction box 15 under the wire 12, and deaerating pump 18 can, when needed, be employed for sucking water out of the water collection tray 19.

Pulp fibers and water are pumped by the deaerating pumps 17 and 18 through cleaner 8 and screens 14 back into the headbox 11. Between the cleaner 8 and the screens 14 there is no need for any additional pump, but when desired a pressure charging pump may be so placed, especially when the arrangement according to the invention is retrofitted

into an existing plant without carrying out any level or piping changes. Moreover, there is no need for the traditional and often used deaeration equipment (such as deculator 9 in FIG. 1) subsequent to the cleaner 8, but when deaeration is desired to further improve the degree of deaeration achieved by the system of FIG. 2, it may be added.

Of course, other alternative systems embodying the invention of FIG. 2 will be readily apparent to persons skilled in the art. The invention is not limited to the lay-out according to FIG. 2. So, for example, the discharge side of pump 18 can be connected directly to the tank 1 and stock may be conducted from the valve 3 to the suction side of the pump 17, all as illustrated by broken lines in FIG. 2. It is also within the scope of the invention to remove totally from the discharge system for the pulp slurry the surge drum 2 shown both in FIGS. 1 and 2, whereby the stock pump 16 charges essentially gas-free slurry directly from the pulp slurry supply means such as tank 1 to the suction side of either the pump 17 or pump 18, depending on whether the hook-up is as shown in solid lines or dotted lines in FIG. 2. However, it becomes important to ensure, as by a suitable slurry flow and regulation in the pump 16, a sufficiently stabilized charge into the white water circulation of pipe system 20.

An important advantage of the method and system (or apparatus) according to the present invention is that the system for a paper-making machine is simplified and can occupy a space of smaller vertical extent than prior art systems as exemplified by FIG. 1, thereby reducing construction costs. The big save-all tray 13 of FIG. 1 becomes unnecessary and the big and awkwardly placed deaeration assembly 9 of FIG. 1 also may become unnecessary. Therefore, it becomes possible to decrease to a large degree both apparatus and construction costs.



As shown in FIG. 3, the deaerating pump for use with the apparatus and method of the present invention preferably comprises a centrifugal pump 30 with a motor 31 and a channel 32 within the pump which is connected to an exterior gas discharge pipe 34, and via valve 36 to a suction or vacuum pump 38, which can be, for example, a well-known NASH™ pump. The drawing also schematically illustrates control valves 36,40 for controlling the reduced pressure generated by suction pump 30. The centrifugal pump 30 has, as is known, a suction opening 42 and a pressure opening 44. A suction duct 46 is mounted to the suction opening. The duct 46 is connected by a valve 40 to the inlet pipe 48 for the fiber suspension. The control circuit further comprises a pressure sensor 50 connected to the suction duct 48 and a control unit 52 which is connected to valve 40 to regulate the operation of the valve.

In operation, the fiber suspension is drawn by pump 30 into suction duct 46 through valve 40 from inlet pipe 48. The flow is constricted by valve 40 in such a way that a reduced pressure is generated in the suction duct and in the suction opening 42 of the pump thereby facilitating the separation of gas from the fiber suspension. Hence, the flow is throttled as much as possible short of avoiding boiling thereof thereby maximizing air removal. Pressure sensor 50 and control unit 52 maintain the pressure in the suction duct sufficiently high to prevent the suspension from boiling due to the reduced pressure. In this manner the amount of gas separated from the suspension in front of the impeller is as great as possible and the separated gas is discharged from the centrifugal pump 30 via the conventional route. Thus, centrifugal pump 30 is pumping suspension through pressure opening 44 and the gas content of the suspension is considerably lower than that of the suspension in the inlet pipe 48. Control unit 54 and pressure sensor 56 also control the pressure difference between the air bubble created in front of the pump impeller

and the pressure in discharge pipe 58 to maintain the pressure differential at the desired level.

Thus, while there have been shown and described and pointed out fundamental novel features of the invention as applied to preferred embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of the disclosed invention may be made by those skilled in the art without departing from the spirit and scope of the invention. The invention, therefore, is to be limited only as indicated by the scope of the claims appended hereto.



CLAIMS

1. An approach flow apparatus for causing a pulp slurry to flow between a pulp slurry storage tank and the forming wire of a forming section of a paper making machine, said apparatus characterized in:

a pipe system (20) for conveying said slurry from said storage tank (1) toward said forming section for permitting the flow of said slurry; and

a deaerating centrifugal pump (16) interposed in said pipe system (20) for causing said slurry to flow, said deaerating centrifugal pump (16) including means for removing gas from said slurry, and means for venting said removed gas to a location outside of said pipe system (20).

2. An approach flow apparatus for supplying an aqueous pulp slurry from a supply means to the forming wire of the forming section of a paper making machine, said apparatus characterized in:

a headbox (11) for depositing said pulp slurry onto said forming wire (12);

a pipe system (20) for conducting said slurry from said supply means to said headbox (11);

a deaerating centrifugal pump (16) interposed in said pipe system (20) for pumping said slurry from said supply means toward said headbox (11);

said deaerating centrifugal pump (16) including means for removing gas from said slurry, and means for venting said removed gas to a location outside of said pipe system (20);

means (15, 19) for collecting the water drained from said slurry in said forming wire (12) of said forming section;

said pipe system (20) including piping (21, 22) for conveying said water collected by said collecting

means (15, 19) to said pipe system (20) upstream of said headbox (11).

3. The approach flow apparatus of claim 2, further characterized in a second deaerating centrifugal pump (17, 18) interposed in said piping (21, 22) for pumping said collected water to said pipe system (20), said second deaerating centrifugal pump (17, 18) including means for removing gas from said collected water, and means for venting said removed gas to a location outside of said pipe system (20).

4. The approach flow apparatus of claim 3, characterized in that said means for collecting water drained from said slurry comprises:

- a suction box (15) underlying a portion of said forming wire (12) for removing water from said slurry on said forming wire (12); and
- a collector (19) underlying said wire (12) for collecting additional water removed from said slurry on said forming wire (12).

5. The approach flow apparatus of claim 4, characterized in that said piping includes one branch (21) for conveying collected water from said suction box (15) to said piping system (20) upstream of said headbox (11), another branch (22) for conveying collected water from said collector (19) to said piping system (20) upstream of said headbox (11); that said second deaerating centrifugal pump (17, 18) is interposed in said piping (21, 22) for pumping said collected water to said pipe systems (20), said second deaerating centrifugal pump (17, 18) including means for removing gas from said collected water, and means for venting said removed gas to a location outside of said pipe system (20).

6. The approach flow apparatus of claim 4, characterized in that said piping includes one branch (21)



for conveying collected water from said suction box (15) to said piping system (20) upstream of said headbox (11), another branch (22) for conveying collected water from said collector (19) to said piping system (20) upstream of said headbox (11), and that said second deaerating centrifugal pump (17) is interposed in said one branch (21) of said piping for pumping collected water from said suction box (15) to said piping system (20) upstream of said headbox (11); and further comprising a third deaerating centrifugal pump (18) interposed in said other branch (22) of said piping (22) for pumping water collected by said collector (19) to said piping system (20) upstream of said headbox (11), said third deaerating centrifugal pump (18) including means for removing gas from said collected water, and means for venting said removed gas to a location outside of said pipe system (20).

7. The approach flow apparatus of claim 6, characterized in that said second deaerating pump (17) further comprises means for creating an underpressure condition in said suction box (11).

8. The approach flow apparatus of claim 4, further characterized in a centrifugal cleaner (8) and a screen (14) in said pipe system (20) upstream of said headbox (11).

9. The approach flow apparatus of claim 6, further characterized in a centrifugal cleaner (8) and a screen (14) in said pipe system (20) upstream of said headbox (11).

10. A method of stabilizing the approach flow system for supplying pulp slurry to a paper machine, characterized in the step of removing gas from said pulp slurry by pumping said slurry in said approach flow system with a deaerating pump interposed in said system.

11. A method of stabilizing the approach flow system for supplying an aqueous pulp slurry to the headbox of a paper making machine for depositing onto the forming wire of a forming section of said paper making machine and for returning to said headbox the water separated from said slurry by passing through said forming wire, comprising the step of removing gas in said separated water by pumping said separated water toward said headbox by a deaeration pump interposed in said system.

12. The method of claim 11, characterized in the step of separating water from said slurry on said forming wire by a suction box underlying said wire, and creating an underpressure condition in said suction box by operation of said deaeration pump.

13. An approach flow apparatus for causing pulp slurry to flow between means for supplying a pulp slurry and a forming wire of a forming section of a paper making machine, characterized in a pipe system for conducting slurry from said supply means to said headbox, and means for removing gas from said pulp slurry in said pipe system, said gas removing means consisting of at least one deaerating centrifugal pump interposed in said pipe system for pumping slurry toward said headbox, said deaerating centrifugal pump including means for removing gas from said slurry, and means for venting said removed gas to a location outside of said pipe syste...



AMENDED CLAIMS

[received by the International Bureau on 17 January 1992 (17.01.92); original claims 1-13 replaced by amended claims 1-13 (4 pages)]

1. Approach flow apparatus for a paper machine for processing fiber suspension or slurry and for conveying a stabilized suspension or slurry flow to a web forming section (12) of a wire of the paper machine, the said apparatus comprising a pipe system (20), an outlet piping of which leads towards the said web forming section (12), and a first inlet piping of which begins from a pulp tank (1) or from a flow control valve (3), like a grammage valve, locating downstream of a level chest (2), and a second inlet piping of which is in a flow connection to the said first inlet piping acting as a so-called short circulation for recycling water drained through the wire, characterized in that at least on inlet piping of the pipe system is provided with a deaerating and/or degassing centrifugal pump (16,17,18) for accomplishing the fiber suspension or slurry flow, the said pump being provided with means for removing air and/or gas from fiber suspension or slurry and with means for discharging the said removed gas and/or air to a location outside the said pipe system.

2. Apparatus according to the claim 1, characterized in that:

a) the outlet conduit of the said pipe system leads to a headbox (11) of the paper machine for supplying fiber suspension or slurry to the said web forming section (12) of the paper machine wire and for accomplishing thereon the web in a form of a aqueous layer of fiber suspension or slurry;

b) the first inlet conduit of the said pipe system in provided at least one deaerating and/or degassing centrifugal pump (16) for removing air and/or gas from the fiber suspension or slurry and for so pumping the same in an essentially decreased contents of air and/or gas, preferably substantially air-free and/or gas-free, via the said outlet conduit into the said headbox (11); and

c) the apparatus further comprises means (15,19) for collecting at least partially the water drained from the aqueous layer of the web of the said fiber suspension or slurry in the said forming section (12) of the wire and for conveying the said water to the said second inlet conduit of the said pipe system.

3. Apparatus according to the claim 2, characterized in that the means for collecting the water drained from the said fibre suspension or slurry comprises:

- a suction box (15) underlying a portion of the said forming wire for removing water from the said fibre suspension or slurry on the said portion of the forming wire, and

- a collector (19) underlying the said wire for collecting additional water removed from the said fibre suspension or slurry on the said forming wire

4. Apparatus according to the claim 2 or 3, characterized in that the said second inlet conduit is provided with at least one another deaerating and/or degassing centrifugal pump (17) for supplying substantially air-free and/or gas-free water from the said water collecting means (15) into the said first inlet conduit in order to stabilize and dilute fiber suspension or slurry flowing therein to a consistency, preferably between about 0,5 and 1,0%, suitable for depositing the said fiber suspension or slurry from the head box (11) into a web form onto the forming wire.

5. Apparatus according to anyone of the claims 1-4, characterized in that the said first and second inlet conduits are both provided with at least one degassing and/or deaerating centrifugal pump (16,17,18) upstream of a joint of the said inlet conduits into a flow connection with each other.

6. Apparatus according to anyone of the claims 1-5, characterized in that the said degassing and/or deaerating pump (16) is located in the first inlet conduit immediately downstream of either the pulp tank (1) or the flow control valve (3).

7. Apparatus according to anyone of the claims 1-5, characterized in that the said second inlet conduit comprises a first branch for conveying collected water from the suction box (15) to the said pipe system (20) and a second branch for conveying collected water from the said collector (19) to the said pipe system (20), and that one degassing and/or deaerating pump (17) is interposed in the said first branch for pumping the collected water as substantially gas-free from the said suction box (15) to the said first inlet conduit upstream of the head box, and that another degassing and/or deaerating pump (18) is interposed in the said second branch for pumping the collected water as substantially gas-free from the said collector (19) to the said first inlet conduit upstream of the head box, and so for stabilizing and diluting fiber suspension or slurry in the said first inlet conduit in two successive steps from a consistency of about between 3% and 5% to a consistency of about between 0,5% and 1,0 %, in which consistency fiber suspension or slurry is debositable from the said head box (11) into a form of a web onto the said forming section (12) of the wire.



8. Apparatus according to anyone of the claims 1-7, characterized in that the degassing pump (17) interposed in the said first branch is a suction box discharge pump maintaining a continuous underpressure condition in the said suction box (15).

9. Apparatus according to anyone of the claims 1-3, characterized in that first degassing pump (17) is a suction box discharge pump for maintaining a continuous underpressure condition in the suction box (15) and for supplying substantially gas-free and/or air-free water in part of the fiber suspension or slurry flow to be conveyed into the head box (11), and that second degassing pump (18) is discharge pump of the collector (19) underlying the wire for recycling collected water therefrom substantially gas-free and/or air-free in part of the fiber suspension or slurry flow to be conveyed into the head box (11), and that at least one third degassing pump (16) is interposed in the inlet conduit for supplying aqueous and substantially gas-free and/or air-free fiber suspension or slurry to the suction side of the said second degassing pump (18).

10. Apparatus according to anyone of the claims 1-3, characterized in that the first degassing pump (17) is the suction box (15) discharge pump for maintaining a continuous underpressure condition in the suction box and for supplying substantially gas-free and/or air-free water in part of the fiber suspension or slurry flow to be conveyed into the head box (11), and that the second degassing pump (18) is a discharge pump of the collector (19) underlying the wire for recycling collected water therefrom substantially gas-free and/or air free back into the pulp tank (1) or into the inlet conduit from the said pulp tank (1), and that at least one third degassing pump (16) is interposed in the inlet conduit for supplying aqueous and substantially gas-free and/or air-free fiber suspension or slurry to the suction side of the said first degassing pump (17).

11. Apparatus according to the claim 9 or 10, characterized in that the said third degassing pump (16) supplies aqueous and substantially gas-free and/or air-free fiber suspension or slurry of low-consistency

- to the suction side of either the said first degassing pump (17) or the second degassing pump (18); or
- to the suction side of both the first degassing pump (17) and the second degassing pump (18).

12. Method of processing the approach flow of aqueous fiber suspension or slurry for supplying pulp slurry to a paper machine, in which method water drained through the wire

is collected and recycled in part of aqueous fiber suspension or slurry flow to be transferred onto a web forming section (12) of the paper machine wire, characterized in that air and/or gas is removed from the water drained through the wire by at least one degassing and/or deaerating pump (17,18) and substantially gas-free and/or air-free water is supplied by means of the very same at least one degassing and/or deaerating pump (17,18) in part of the fiber suspension or slurry flow to be transferred onto the web forming section (12) of the wire for stabilizing the said flow and diluting the same into a suitable consistency, preferably to a consistency between 0,5% and 1,0, in which consistency the said pulp slurry is debositable into a web form onto the wire.

13. Method according to the claim 12, characterized in that the consistency of the pulp slurry to be supplied onto the web forming section (12) is diluted in two successive steps by substantially gas-free and/or air-free water supplied from a suction box (15) underlying the web forming section (12) of the wire and by substantially gas-free and/or air-free water supplied from an additional water collector (19) underlying the wire.





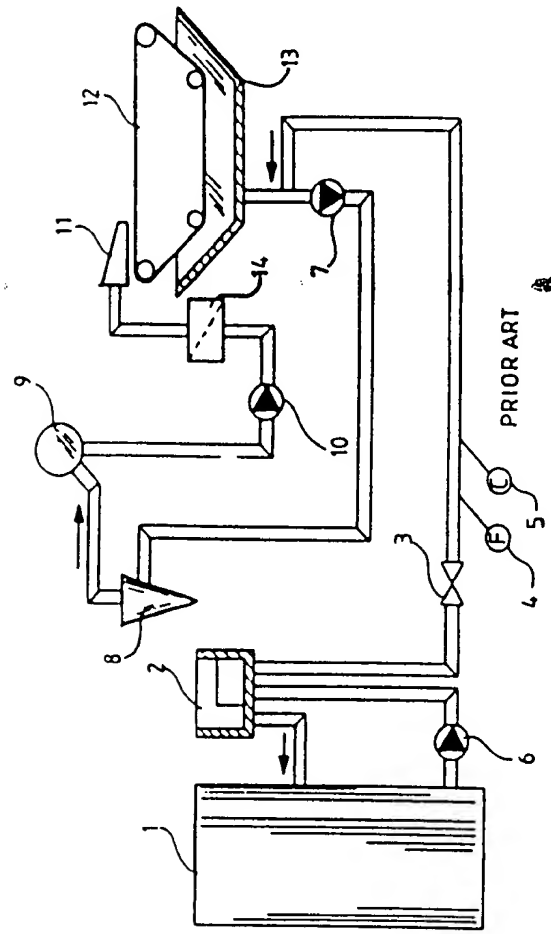



FIG. 1

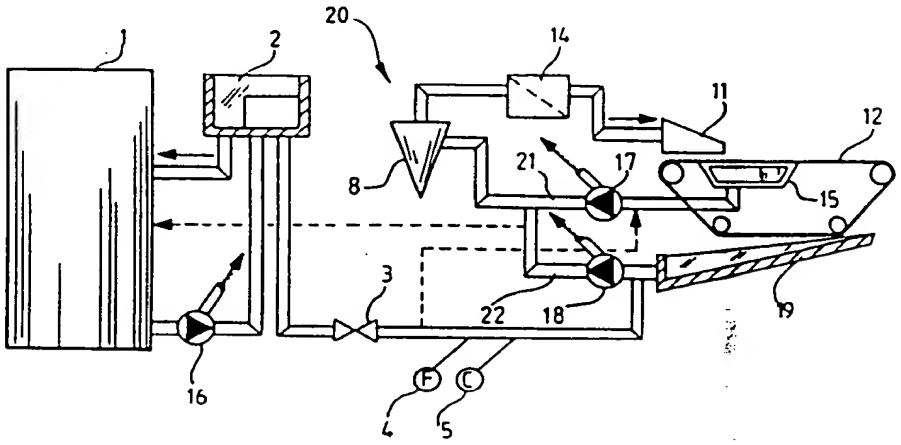
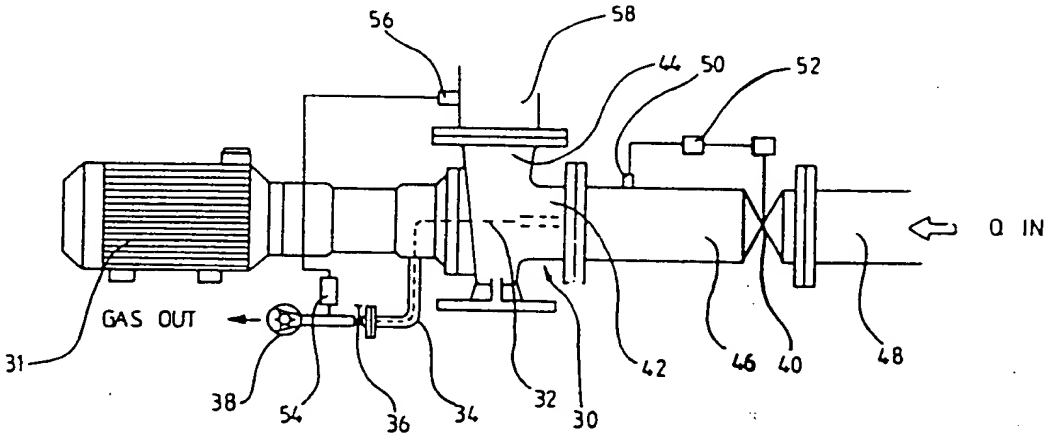

20
14
2
1
11
12
8
21
17
15
3
22
18
19
16
F
C
4
5

FIG. 2




56
58
44
50
52
O IN
GAS OUT
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38
54
36
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32
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42
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48

FIG. 3